

# CONCEPT OF FUNCTIONAL DENTITION AND IMPACT ON THE QUALITY OF LIFE OF PARTIALLY EDENTULOUS PATIENTS.

Concepto dentición funcional e impacto en la calidad de vida de los pacientes desdentados parciales.

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## ABSTRACT:

**Main Objective:** To compare, through the OHIP-7Sp, the impact on the quality of life of partially edentulous patients, according to WHO criteria "with functional dentition", 21 or more teeth and "without functional dentition", less than 21 teeth.

**Material and Methods:** 97 partially edentulous patients were selected between 35 and 75 years old, ASA I or II with  $\leq 28$  teeth remaining. Were divided in two groups, non-functional dentition (NFD)  $n=47$  and functional dentition (FD)  $n=50$ . OHIP-7Sp survey was applied to each patient to measure the impact on quality of life in the seven dimensions considered in this survey. The scale of measurement ranges from 0 to 4, in which 0 is "never" and 4 "always", with a maximum value of 28, considering the instrument in its entirety. Highest score indicates a greater impact on quality of life. For comparison of both groups, the non-parametric Mann-Whitney test was used with a level of 95% significance.

**Results:** Concerning all patients evaluated through the OHIP-7Sp, the mean age was 53 years. There were significant differences in the total OHIP-7Sp score, with a mean and median for the NFD group of 9.53 and 9 and for the FD group 5.02 and 5, respectively. Disaggregating the analysis, significant differences emerged in dimensions 2, 3, 4, 5, and 6 ( $p<0.05$ ).

**Conclusion:** There was a significantly greater impact on the quality of life, measured with the OHIP-7Sp, in the NFD group compared to the FD group.

## KEYWORDS:

*Oral Health; quality of life; ohip-7; dentition; mouth, edentulous; Chile.*

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## RESUMEN:

**Objetivo Principal:** Comparar mediante el OHIP-7Sp, el impacto en la calidad de vida de pacientes desdentados parciales, según criterio OMS "con dentición funcional", 21 o más dientes y "sin dentición funcional", menos de 21 dientes. 0

**Material y Métodos:** Fueron seleccionados 97 pacientes desdentados parciales entre 35 y 75 años, ASA I o II con remanencia de  $\leq 28$  dientes. Fueron divididos en 2 grupos, dentición no funcional (DNF) n=47 y dentición funcional (DF) n=50. Se aplicó encuesta OHIP-7Sp a cada paciente para medir el impacto en la calidad de vida en las 7 dimensiones que contempla esta encuesta. La escala de medición, abarca de 0 a 4, en la cual 0 es "nunca" y 4 "siempre", con un valor máximo de 28, considerado el instrumento en su totalidad. El puntaje más alto indica un mayor impacto en la calidad de vida. Para la comparación de ambos grupos se utilizó el test no paramétrico de Mann-Whitney con un nivel de significancia del 95%.

**Resultados:** Del total de pacientes evaluados mediante el OHIP-7Sp, el promedio de edad fue de 53 años. Hubo diferencias significativas en el puntaje del OHIP-7Sp total, con una media y mediana para el grupo DNF de 9,53 y 9 y para el grupo DF de 5,02 y 5, respectivamente. Desagregando el análisis, emergieron diferencias significativas en las dimensiones 2, 3, 4, 5, y 6 ( $p < 0,05$ ).

**Conclusión:** Hubo significativamente mayor impacto en la calidad de vida, medido con el OHIP-7Sp, en el grupo DNF comparado con el grupo DF.

## PALABRAS CLAVE:

*Calidad de Vida; salud bucal; ohip-7; dentición; boca edéntula; Chile.*

## INTRODUCTION.

Tooth loss, whether partial or total, is a pressing public health problem in Chile<sup>1</sup> and the rest of the world. Although it is described as the result of a multifactorial process, the main causes are associated with caries and periodontal disease, two of the most prevalent pathologies worldwide.<sup>2</sup> Tooth loss causes alterations of multiple functions in the oral cavity.<sup>3</sup>

In this regard, it should be noted that the term "functionality" refers to the correct performance of programmed tasks described for each organ,<sup>4</sup> and it is important to consider that it acquires different meanings depending on personal experiences and the subjective analysis of each individual. In the oral cavity, although this idea is replicated, it becomes more complex by understanding that the teeth act together and that each sector is "designed"

to carry out different actions, specific but no less complementary. This is how the functions of incising food, aesthetics, and phonation are attributed to anterior teeth. Posterior teeth contribute to the tasks of grinding and formation of the food bolus, as well as stabilization of the dental arches, determined by their location and morphology.<sup>5</sup>

In this context, the World Health Organization (WHO) updated its global oral health objectives and goals set for the year 2020, establishing a new concept of Functional Dentition (FD), based on the presence of 21 or more teeth in the mouth.<sup>6</sup> However, there is little empirical evidence regarding whether a "quantitative" definition has positive or negative relevance in the quality of life of patients.

"Quality of Life" is defined as "an individual's perception of their position in life, in the context of the culture and value systems in which they

live, and in relation to their goals, expectations and concerns".<sup>7</sup>

Specifically in the dental-stomatological field, various indices have been developed to try to account for the relationship between quality of life and oral health. One of the instruments is the OHIP<sup>8-10</sup> (acronym for Oral Health Impact Profile), which has different versions depending on the number of items or dimensions it contains, with its limited version (OHIP-7Sp), validated in Chile.<sup>11</sup>

Currently there are no reports of studies of the impact on quality of life using the OHIP-7 instrument and comparing "functional" and "non-functional" dentition, so this study could provide data focused on future decisions in the field of prevention and potential treatment for the population, according to the "functionality" that partially edentulous patients present.

The aim of this study is to verify, through the application of the OHIP-7Sp, the impact on oral health-related quality of life, comparing patients with and without functional dentition (FD) and (NFD), in accordance with the "quantitative" definition of the WHO. Therefore, the proposed hypothesis is null: there are no significant differences between the impact on the quality of life of patients with or without functional dentition.

## **MATERIALS AND METHODS.**

This observational descriptive study followed the STROBE guidelines for clinical studies. It was carried out at the School of Dentistry of Universidad Andrés Bello, Santiago, Chile, between April and October 2019. The research protocol was approved by the ethics committee with the code PROPRGFO\_002019.91. (Annex 1), including the informed consent of all the participants (Annex 2).

Patient recruitment was carried out according to the following inclusion criteria: patients between 35-75 years old, ASA I or II, partial edentulousness of 1 or more teeth, referred to complete rehabilitation with removable prostheses.

Patients with a complete edentulous arch,  $\geq 28$

teeth present in the mouth, teeth with periodontal disease in active stages III and IV and mobility, and teeth with defective restorations were excluded from the study.

For the calculation of the sample size (n), a statistical power of  $(1-\beta)$  80% was considered with a type I error ( $\alpha$ ) =0.05, resulting in an approximate total of 46 patients per group. For this analysis, the GPower program, version 3.1.9.2, was used.

Of a total of 640 patients (approximately) who attended the dental clinic for consultation and/or treatment in the aforementioned period, 97 patients were randomly selected according to the criteria described above. In this way they were divided into two groups, according to the number of teeth in accordance with the requirements of the WHO, that is, NFD ( $\leq 20$  teeth) FD ( $\geq 21$  teeth). The resulting number of respondents were 47 in the NFD group, and 50 in the FD group.

The study subjects answered the 'OHIP-7Sp' questionnaire on oral health-related quality of life (Table 1), safeguarding the anonymity of the data provided, where the operator was only present to resolve the questions that arose, keeping data in a sealed envelope until the corresponding analysis.

In the OHIP-7sp survey, a value was given for each question according to its respective response. The answers were categorized on a scale from 0 to 4; "never" (value 0), "almost never" (value 1), "sometimes" (value 2), "frequently" (value 3), and "always" (value 4). The total score was obtained from the sum of the 7 questions and the total result could vary in a range from 0 to 28 points. A higher value indicates a greater impact on quality of life or a "more negative" result.

The exploration of the results was carried out for each question according to the dimensions to which they belonged (Table 1).

The surveys/questionnaires were applied by 2 researchers, who did not know to which group each patient belonged. Then all the data collected was codified, allowing them only to answer pertinent questions from the participant. Data analysis was performed by a blinded operator, who proceeded

to process the codes using the SPSS 22.0 Windows program (SPSS, Chicago, IL, USA). The categories of the score on the survey scale were arranged together and ordered. To compare the categorical values of both groups, the non-parametric Mann Whitney test was used with a significance of 95% ( $\alpha=0.05$ ).

## RESULTS.

**Descriptive:** Of the 97 patients selected and surveyed, 61.9% (60) were females and 38.1% (37) were males. The mean age of the respondents was 53.04. Distributions according to age group were 35-44 years: 22.7% (22); 45-59 years: 49.5% (48), and 60-75: 27, 8% (27). Age distribution (Table 2).

When analyzing the results of the impact on the quality of life of the respondents in the NFD and FD groups according to the results described in Table 3, these are grouped according to the mean, standard deviation, and median for each dimension and for the total score of the OHIP7-Sp questionnaire.

In general, when observing the means in both groups, it can be extrapolated that the most affected dimensions for the NFD group were D2 with 2.02, D3 with 2.62, and D5 with 1.52; while for the FD group, the most affected dimensions were D2 and D3, with mean values of 1.84 and 1.24. Regarding the least affected dimensions in increasing order for NFD, they were D4, D1, and D7; and for FD, they were D4, D6, and D7, being D4 (0.04) the item that had the lowest mean value measured in the quality-of-life instrument.

When comparing the means of all the analyzed dimensions of both groups, it can be stated that there was a lower value for the FD group, this difference being significant in dimensions 3, 4, 5, 6, and total ( $p<0.05$ ).

In addition, it was observed that in all comparisons the standardized Z-score was negative in all cases, which indicates that the response ranges of the FD group are lower than those of the NFD group, suggesting that there is a lower impact on the quality of life in the FD group.

**Table 1.** Dimensions and questions included in the OHIP-7Sp questionnaire.

	Dimension	Question
D1	Functional limitation	Have you felt that your digestion has worsened due to problems with your teeth, mouth, or dentures?
D2	Physical pain	Have you had sensitive teeth, for example due to cold foods or liquids?
D3	Psychological discomfort	Have dental problems made you totally unhappy?
D4	Physical disability	Have people misunderstood some of your words because of problems with your teeth, mouth, or dentures?
D5	Psychological disability	Has your sleep been interrupted by problems with your teeth, mouth, or dentures?
D6	Social disability	Have you had difficulty doing your usual job because of problems with your teeth, mouth, or dentures?
D7	On disadvantage	Have you been totally unable to function because of problems with your teeth, mouth, or dentures?

**Table 2.** Mean, median, and standard deviation of the age of the respondents according to the total and the NFD and FD groups.

	MEAN	MEDIAN	STANDARD DEVIATION
No Functional Dentition (NFD)	53.92	54.00	10.31
Functional Dentition (FD)	52.52	50.00	9.93
General	53.04	52.00	10.07

**Table 3.** OHIP-7Sp results according to dentition type groups with the mean range and significance.

Dimension	No Functional Dentition			Functional Dentition			Difference Mean Ranges	Z-score	Significance Test
	Mean	SD	Median	Mean	SD	Median			
D1	0.70	1.20	0	0.56	1.01	0	2.66	-0.839	0.402
D2	2.02	1.51	2	1.84	0.96	2	5.53	-1.047	0.295
D3	2.62	1.53	3	1.24	1.25	2	24.17	-4.382	0.000*
D4	0.68	1.16	0	0.04	0.28	0	12.55	-3.595	0.000*
D5	1.57	1.47	2	0.74	1.08	0	15.19	-2.924	0.003*
D6	1.02	1.31	0	0.36	0.75	0	13.67	-2.796	0.005*
D7	0.91	1.40	0	0.32	0.80	0	8.69	-1.903	0.057
Total	9.53	5.75	9	5.02	3.19	5	24.06	-2.959	0.000*

SD:Standard Deviation. \*: Indicates that there are statistically significant differences ( $p < 0.05$ ).

## DISCUSSION.

According to the results obtained, the proposed null hypothesis is rejected, showing that there is a statistically significant difference between the groups with NFD and FD, a statement supported by the total value of the OHIP-7Sp.

These data would be in some agreement with studies carried out by Bellamy *et al.*,<sup>12</sup> in Mexican older adults and by Rodakowska *et al.*,<sup>13</sup> in the Polish adult population, reporting that in the total OHIP-14, there was also a difference in the impact

of quality of life between individuals with FD and NFD. In addition, it is mentioned that the mean and median value of the NFD group was below the cut-off level of negative impact on quality of life, unlike the FD group that was above the negative impact level, which have been defined at 7 points for the OHIP-7Sp validated in Chile.<sup>11</sup>

However, when disaggregating and analyzing in particular the 7 dimensions (D) that make up the OHIP-7Sp, not all of them showed significant differences, which is why it seemed intellectually

challenging to weight each dimension, since in each one of them examines different topics regarding the "quality of life" of patients:

D1 refers to "functional limitation", but the question focuses on the evaluation of digestive function, showing in the results that there was no difference between the groups. The above could be explained due to the existence of other influencing factors, such as the type of diet of the patients or the consistency of the food, in addition to the socioeconomic situation associated with eating habits and the location of the remaining teeth. Apparently, regardless of the presence or absence of teeth, patients could achieve similar masticatory performance by adjusting their diet in accordance with the factors previously exposed.<sup>14,15</sup>

This dimension was one of those that had the least impact on quality of life, contrary to what was published by Padilla-Sanchez *et al.*,<sup>16</sup> for whom functional limitation was one of the most affected dimensions, which could be due in part to the fact that in this study the participants were elderly patients with an mean age of 50 years, susceptible to having a lower adaptive capacity than younger patients. Furthermore, it is believed that it would be of interest to further study how "age" affects each dimension, since it was not considered in the objectives of this study.

D2 indicates the evaluation of the existing sensitivity in the teeth, where there are no differences between both groups. However, this was one of the dimensions with the greatest impact on quality of life. These data agree with a recent study published by Rodakowska *et al.*,<sup>13</sup>

The authors attribute the presence of dentin hypersensitivity to gingival recessions and/or cervical lesions, which, depending on the age range, can reach up to 98% prevalence, with a "peak" occurring between 30 and 40 years of age. It is necessary to mention that both dentin sensitivity and/or cervical lesions were not evaluated in this study, but that it would undoubtedly be of interest to include them in future research to reduce

possible biases in this regard. Consequently, it should be noted that pain is a sensory experience, complex to objectify, since it is related to the psychological characteristics of each individual and may also influence in some way the results of the present dimension.<sup>17</sup>

D3 turned out to be the second most affected dimension according to the survey. These findings agree with those provided by Batista *et al.*,<sup>18</sup> carried out in Brazil, who applied the OHIP-14 to a population of adults with tooth loss, indicating that there was no difference between FD and NFD groups. Results that also agree with another study carried out on Chilean women in which this dimension was one of the most affected.<sup>19</sup>

Regarding the differences found between the FD and NFD groups, it could be argued that they may be due to the fact that edentulism can cause changes in most of the dimensions that translate into poorer quality of life, namely impaired chewing, trauma from prosthetic devices, aesthetic concerns, or negative self-perception.<sup>20</sup>

Teeth play a significant role in facial appearance, oral expression, and the ability to eat, and there is evidence showing how these factors, which are generators of edentulousness, also negatively affect the quality of life of the elderly.<sup>21,22</sup> Likewise, an altered oral function has been related to a decrease in self-esteem and low psychosocial well-being.<sup>23</sup>

However, it is possible to find patients who, even having fewer than 21 teeth, conserving a large part of these in sextants II and/or V, and without alteration of phonation, allows them to obtain a satisfactory self-perception of their quality of life, as the "aesthetic" factor is not threatened. Unfortunately, this assertion cannot be reliably supported since this study did not include a characterization of the missing teeth (type of tooth) or a comparative analysis in this regard.

Regarding dimension D4, even though in this study patients with NFD presented worse quality of life compared to those in the FD group, this was one of the dimensions with the least impact

on the quality of life of both groups. In this regard, this conclusion is contradictory with what was suggested by Bellamy *et al.*,<sup>12</sup> who indicated that it was one of the most affected dimensions.

It should be noted that, in general, this study did not carry out a comparison between the two groups. The above mentioned could be explained because although the question in the OHIP7-Sp refers to a specific phono-articulation problem, it seems that a broader understanding of the term "physical disability" would imply other factors, either aesthetic nature, alteration of the masticatory function, or some others.<sup>24</sup>

Similarly, related to the descriptor of the dimension in D5, although the question is labeled as "psychological disability", it refers to problems with sleeping, and specifically with sleep. It is very plausible that this difficulty is more related to stress, anxiety, worries about daily activities or other factors, which is consistent with the data from the already mentioned study carried out on toothless Chilean women, which showed a higher level of impact on the quality of life.<sup>19</sup>

Now, in the case of patients with NFD, it could be attributed to a worse quality of life since the patient, having less than 21 teeth, could face many problems related to sensations and negative life experiences, exemplified in the previous dimensions, and that are related to phonation, aesthetics, and chewing.

With respect to D6, specified as "social disability", significant differences are observed in the NFD group, since the concept of "social sphere" encompasses multiple factors that could influence the insertion and work performance of people, for example, personality and character of individuals.

Obtaining statistically significant results could help to demonstrate that the presence of fewer than 21 teeth (NFD) would affect quality of life due to a pernicious influence related to the aforementioned aspects, such as aesthetics and phonation, which are fundamental in the social insertion of a person. The latter is not verified in the case of patients with partial edentulism and

FD, in whom there would be no negative influence on their quality of life. These results agree with those obtained by Ortuño *et al.*,<sup>19</sup> in a study carried out on Chilean edentulous women.

Finally, regarding D7, despite the fact that naturally, like in dimensions D1 and D2, NFD would be related to a decrease in people's quality of life, this study does not reflect such a situation, being the third dimension with less impact with respect to the others analyzed. This agrees with the study conducted by Rodakowska *et al.*,<sup>25</sup> who applied the OHIP-14 to a population of older adults. It should be noted that D7 does not show significant statistical differences between the two groups. However, this figure is close to the previously defined limit value. This may make it necessary, in future studies, to increase the number of patients to confirm whether there are objective differences in this dimension.

The OHIP-7Sp instrument was selected since it considers the perception of the individual in the last twelve months, (in comparison with other instruments in which this chronological range is from 3 to 6 months). It is also a limited and simplified survey when compared with its original version; it is easy to apply, and has been validated in Chile with a Conbrach alpha of 0.93, which is considered a high consistency value, indicating that the individual items measure the same construct as the whole set.<sup>11</sup> This allowed the collection of data, especially in the older adult participants included in this study.

### Limitations

There are different instruments for evaluating oral health-related quality of life, and specifically in terms of oral health; among them, OHIP-49, OHIP-14, OHIP-7Sp, OHRQL, and GOHAI stand out.<sup>26,27</sup> In this study, the OHIP-7Sp instrument was used for the reasons previously explained (reduced version of 49 and 14).

However, it is thought that it would be interesting in future research to apply the OHIP-14 or OHIP-49 surveys to determine whether there are differences in the impact on the oral-health

related quality of life with greater accuracy, when comparing patients with FD and NFD.

Another limitation of this study is that an objective and detailed evaluation of the conditions or status of the teeth and/or restorations present in the mouth was not carried out. It was done in this way since in the WHO criteria, this aspect or factor is not specified, so it would be advisable to carry out a study that does incorporate this variable to reduce possible biases.

Finally, when analyzing the OHIP-7Sp instrument in toto, it is evident that the condition NFD versus FD, raised in quantitative terms by the WHO, has a significant effect on the quality of life of the patients who participated in this study. On the other hand, the assessment of the impact of oral health on people's quality of life is a valuable input, to underline the importance of

public oral health policies, both in the prevention and in the treatment of morbidities that affect the population. It is felt that this work can help in the design of oral health proposals focused on improving people's quality of life.

## **CONCLUSION.**

There was a significantly greater impact on quality of life, as measured with the OHIP-7Sp, in the group without functional dentition compared to the group with functional dentition.



**Conflict of interests:**

The authors declare no conflict of interest.

**Ethics approval:**

Approved by the Ethics Committee of the Andres Bello University School of Dentistry; code number PROPRGFO\_002019.91.

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**Authors' contributions:**

Fernández E: Contribution to the design, conception and intellectual content of the study.

Olmedo L: Operator and contributed to the design and conception of the study.

Jaramillo P: Operator and contributed to the design and conception of the study.

Nakouzi J: Editing of the article and contribution to the study design.

Vildósola P: Contribution to the intellectual content and editing of the article.

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